Space Weather Forecast

Issued on Monday 28 October 2024 at 00:44 Local

This forecast provides a four-day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales

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Space Weather Forecast Headline: S2 Moderate Solar Radiation Storm ongoing. Glancing coronal mass ejection may bring G1-G2 Minor to Moderate storms early day 1 (28 Oct). Further Moderate to Strong Solar Flares flares also likely.

Analysis of Space Weather Activity over past 24 hours

Solar Activity: Moderate activity with the strongest flare a Moderate class flare from an active region on the northeast limb. There are twelve sunspot regions currently on the disc, with the most complex a region in the southeast, which is the central component of three complex regions across the southeast. There has also been notable development across a region to the northwest of this group, but still in the southeast. The other spots on the disc are mostly simple, or smaller, with only slow growth or decay observed. However, the new region moving onto the disc from over the northeast limb is bright in SDO aia-imagery, and is starting to show some potential complexity as it moves into a less oblique viewing angle, but remains difficult to analyse.

No Earth-directed CMEs (coronal mass ejections) were observed in this period.

Solar Wind / Geomagnetic Activity: The solar environment through the day showed a slight decline due to the arrival of a glancing CME on the 26 Oct originating from a strong flare on 24 Oct. A further glancing CME arrival was also likely observed later in the period, associated with another strong flare on 26 Oct. Solar winds, observed by ACE at L1, were slightly elevated throughout this period, on a slow declining trend. Some slight perturbation to the solar wind was observed later on 27 Oct which may have been a further glancing CME, but no notable increase was observed. Interplanetary Magnetic Field (IMF), was initially strong but eased to weak levels by the end of the period, showing no enhancement from the potential glancing CME. The north-south component was initially weak to moderate and mainly positive (northward), but varied weakly between the north and south directions from around 27/1030 UTC. Geomagnetic activity was Quiet to Unsettled (Kp1-3).

Energetic Particles / Solar Radiation: The count rate of energetic particles (High energy protons) rose gradually for much of the period, initially above the S1 Minor Storm level, it surpassed the S2 Moderate storm level just after 27/0830 UTC. This flux continued to slowly rise for a time, but became relatively steady towards the end of the period, with the particles likely being "snow-ploughed" ahead of the expected CME arrival.

Issued by Met Office Space Weather Advisor, Tel: +44 (0) 370 900 0100 Email: enquiries@metoffice.gov.uk

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Four-Day Space Weather Forecast Summary

Solar Activity: Moderate to High activity is expected, with further Moderate class flares expected and a chance of isolated Strong class flares.

Solar Wind / Geomagnetic Activity: A glancing CME likely associated with the strong flare on 26 Oct may have weakly glanced near Earth satellites around 28/2230 UTC. This recent potential glancing impact from this CME gives a chance of G1-G2 Minor to Moderate storms in the coming hours, but if Earth sees more of the CME then an isolated G3 Strong storm cannot be ruled out. However, it has also not been completely ruled out that the majority of the CME misses Earth, and only a very slight glancing impact continues to be observed. This will likely become more apparent over the next few hours as we observe this CMEs interaction with Earth.

Ongoing influence of the CME may continue into day 2 (29 Oct), along with any weak connection with a coronal hole, with further Active to G1 minor storm intervals possible, however winds will likely to be easing to be slightly elevated, perhaps background by the end of the period. Aside from the CME arrival, mainly Quiet to Unsettled geomagnetic conditions are expected. However, any further notable flares and associated CMEs may change this.

Energetic Particles / Solar Radiation: The count rate of energetic particles (High energy protons) is expected to persist at S2 Moderate Radiation Storm levels initially. A rapid fall in observed energetic particles is likely through Day 1 (28 Oct). However further notable flares, will bring the potential for further enhancements through the period.

Geomagnetic Storms

Geomagnetic Storm Probability (Exceedance)	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Minor or Moderate	**G1 to G2**	No	50	20	5	5
Strong	**G3**	No	15	1	1	1
Severe	**G4**	No	2	1	1	1
Extreme	**G5**	No	1	1	1	1

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Radio Blackouts - X-Ray Flares

X-Ray Flares	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC)	Day 2 (00-24 UTC)	Day 3 (00-24 UTC)	Day 4 (00-24 UTC)
Probability			(%)	(%)	(%)	(%)
Active	R1-R2 (M Class)	No	80	80	80	80
Very Active	R3-R5 (X Class)	No	30	25	20	20

Solar Radiation Storms (High Energy Protons)

Radiation Storms	Level ($cm^{-2}sr^{-1}s^{-1}$)	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC)	Day 2 (00-24 UTC)	Day 3 (00-24 UTC)	Day 4 (00-24 UTC)
Probability (Exceedance)			(%)	(%)	(%)	(%)
Active	≥ S1	Yes	99	80	25	25
Very Active	≥ S3 *	No	20	15	10	10
* S3 ≥ 10 MeV ≥ 1000 pfu and/or 50 MeV ≥ 10pfu. (pfu = $cm^{-2}sr^{-1}s^{-1}$)						

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